



April 10, 2014

Congressional Committees

***Presidential Helicopter Acquisition: Update on Program's Progress toward Development Start***

In June 2009, the Department of Defense (DOD) terminated the Navy's VH-71 presidential helicopter program because of cost growth, schedule delays, and a projected shortfall in system performance. The Navy subsequently began work to define a follow-on program, now known as VXX, to acquire helicopters to replace the existing presidential helicopter fleet. The Ike Skelton National Defense Authorization Act for Fiscal Year 2011 mandated that we review and report annually to the congressional defense committees on the program beginning in 2011 and ending in 2013.<sup>1</sup> We issued three reports in response. In the first, we identified major lessons learned from the terminated program that should be applied in the follow-on program.<sup>2</sup> In the second, we provided information on the program's delays and on DOD's planned upgrades to the in-service fleet and plans for moving the program forward.<sup>3</sup> In the third, issued last year, we found that the Navy had made progress toward establishing a sound business case that reflected a rational balance between requirements, costs and schedule.<sup>4</sup> At the time of our last report, the Navy had just finalized its VXX requirements.

Given the VH-71 program experience and the importance of developing a helicopter to replace the current fleet of presidential helicopters in a timely manner, the House Armed Services Committee, Tactical Air and Land Force Subcommittee requested that GAO continue to monitor the VXX presidential helicopter acquisition through a series of reviews, with each of those reviews tailored to where the program is in the acquisition process, and provide GAO's assessment of the program. Subsequently, the National Defense Authorization Act for Fiscal Year 2014 mandated that we continue to review and report on the program annually to the congressional defense committees.<sup>5</sup> This report discusses the program's consistency with acquisition best practices and meeting corresponding requirements as it approaches the start of system development in the engineering and manufacturing development phase of DOD's acquisition process. Specifically, it discusses independent assessment of the program's technology readiness, trade-offs made to ensure affordability and requirements approval, development of an independent cost estimate, use of competitive prototyping, and completion of a preliminary design review (PDR).

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<sup>1</sup>Pub. L. No. 111-383, § 233.

<sup>2</sup>GAO, *Defense Acquisitions: Application of Lessons Learned and Best Practices in the Presidential Helicopter Program*, [GAO-11-380R](#) (Washington, D.C.: Mar. 25, 2011).

<sup>3</sup>GAO, *Presidential Helicopter Acquisition: Effort Delayed as DOD Adopts New Approach to Balance Requirements, Costs, and Schedule*, [GAO-12-381R](#) (Washington, D.C.: Feb. 27, 2012).

<sup>4</sup>GAO, *Presidential Helicopter Acquisition: Program Makes Progress in Balancing Requirements, Costs, and Schedule*, [GAO-13-257](#) (Washington, D.C.: Apr. 9, 2013).

<sup>5</sup>Pub. L. No. 113-66, § 252 (2013).

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To conduct this work, we identified acquisition best practices, based on GAO's extensive body of work in that area and DOD guidance, as well as the Weapon Systems Acquisition Reform Act of 2009 (WSARA) and other statutory requirements.<sup>6</sup> We then analyzed program documentation, including the VXX acquisition strategy, systems engineering plan, acquisition decision memorandums and other documents required prior to the start of system development. We interviewed program and agency officials from the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)); the Deputy Assistant Secretary of the Navy, Air Programs; the Navy's Program Manager, Presidential Helicopter Program Office; Marine Helicopter Squadron One (HMX-1)—the presidential helicopter fleet operators, and a representative from the White House Military Office about plans to start system development for the VXX. We discussed capability trade-offs that have been made to ensure that the system is affordable and the program's rationale for deferring the PDR and plans to mitigate program risks. We also met with an official from the Director of the Office of the Secretary of Defense (OSD), Cost Assessment and Program Evaluation (CAPE) to discuss the independent cost estimate developed for the program. In addition, we reviewed the Navy's independent assessment of the readiness of the program's subsystem technologies and visited the VXX systems integration laboratory where these technologies are being designed and tested.

We conducted this performance audit from July 2013 to April 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## Results in Brief

We found that the Navy continued to make progress in the past year toward (1) establishing a knowledge-based program that generally aligned with acquisition best practices and (2) meeting corresponding statutory certification requirements for entering the DOD acquisition process in the engineering and manufacturing development phase. The Navy has met or expects to meet requirements relating to assessment of technology readiness, making appropriate trade-offs to achieve affordability and getting approval of requirements, and development of an independent cost estimate. DOD has, however, waived a requirement for competitive prototyping and the Navy plans to defer a system level PDR until after the start of development. We reviewed DOD's waiver of competitive prototyping for the VXX program last year and found that it addresses one of the two bases provided in WSARA for such waivers; that is, that the cost to provide competitive prototypes exceeded the expected benefits.<sup>7</sup> In addition, while the Navy's plan to defer a system level PDR until after the start of system development deviates from acquisition best practices and is a waiver of a statutory requirement, a number of factors, such as the program's reliance on mature technologies and selection of an existing aircraft, suggest reduced risk in this deferral.

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<sup>6</sup>Pub. L. No. 111-23, as amended.

<sup>7</sup> GAO, *Department of Defense's Waiver of Competitive Prototyping Requirement for the VXX Presidential Helicopter Replacement Program*, [GAO-13-826R](#) (Washington, D.C.: Sept. 6, 2013).

## Background

The Marine Corps' HMX-1 (Marine Helicopter Squadron One) uses a fleet of 19 VH-3D and VH-60N helicopters to transport the President in the national capital region, and when traveling in the continental U.S. and overseas. These aircraft have been in service for decades. The events following the September 11, 2001, terrorist attacks on the United States highlighted the fleet's need for improved transportation, communication, and security capabilities. As a result, a program (subsequently designated the VH-71 program) was initiated in April 2002 to develop aircraft to replace the helicopters currently in service. Initial plans to field the VH-71 by 2011 were accelerated in response to a November 2002 White House memorandum directing that a replacement helicopter be fielded by the end of 2008. By 2009, significant cost growth plus schedule delays and performance issues resulted in the decision to terminate the VH-71 program. At that time, the estimated VH-71 program cost had doubled from about \$6.5 billion at the start of development in 2005 to \$13 billion. Because the need to replace the current presidential helicopters remained, OUSD(AT&L) directed the Navy to present a plan to develop options for a new program to acquire replacement helicopters, now designated VXX.

The Navy's VXX efforts began immediately with the initiation of an Analysis of Alternatives (AOA) in 2009 to assess options on how to develop and field the replacement. It was focused, at least in part, on one of the primary lessons learned from the VH-71 experience—the need to establish and maintain a sound business case. A sound business case is one in which a balance is established among requirements, costs, and schedule that reflects an executable program with acceptable risk.<sup>8</sup> According to program officials, the VXX program would follow best practices and pursue a knowledge-based acquisition approach to establish and maintain an affordable business case.

In February 2012, we reported that VXX program's entry into development had been delayed as the program worked to provide a sound initial business case for development. The Navy produced its initial AOA report in 2010 but was directed by OUSD(AT&L) to update the study and use a streamlined acquisition strategy focused on mitigating cost drivers identified in the 2010 study. OSD provided additional guidance in December 2011 for the 2012 update, which reflected insights on requirements and knowledge gained in the 2010 study and using a streamlined acquisition approach proposed by the Navy. The proposed approach would make use of mature commercial and military technologies being developed outside of the program before including them on aircraft selected for the program with their adoption facilitated by open systems architectures. Commercial or military aircraft in production would then be selected and government-provided mature technologies would be integrated into the aircraft. We also reported on DOD's planned upgrades to the fleet of in-service, legacy helicopters. The termination of the VH-71 program and delays in the VXX effort necessitated efforts to extend the life and upgrade the capabilities of the current presidential helicopters.<sup>9</sup>

In April 2013, we reported that the Navy had made progress in the prior year in establishing a sound VXX business case that reflects a rational balance between requirements, costs and schedule. The Navy updated the AOA in 2012, based on the acquisition approach of integrating mature technologies from outside the program onto an existing commercial or military aircraft. The 2012 AOA reflected additional trade-offs made among cost, schedule, risk, and performance. Those performance trade-offs enable the Navy's acquisition approach of integrating mature technologies onto an existing aircraft and are expected to result in reduced

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<sup>8</sup>GAO-11-380R.

<sup>9</sup>GAO-12-381R.

cost and schedule. The 2012 AOA estimated that the proposed approach of entering the acquisition process in the engineering and manufacturing development phase rather than proceeding with a technology development phase, as was anticipated in the 2010 study, would reduce investment cost by approximately \$1.5 billion (19.7 percent) and shorten the development schedule by about 18 percent.<sup>10</sup>

The Navy released a request for proposals for the engineering and manufacturing development phase for the VXX Presidential Helicopter Replacement Program on May 3, 2013, and is currently in source selection. It anticipates awarding contracts to initiate engineering and manufacturing development in mid-fiscal year 2014.

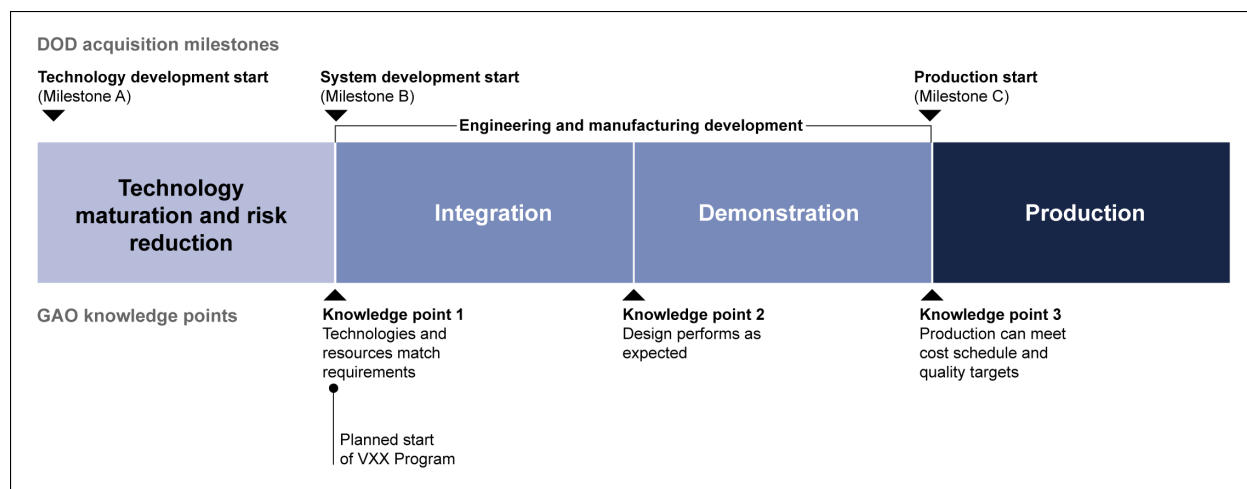
### **Program Continues to Progress toward Demonstrating Key Knowledge by Development Start**

The Navy's VXX program continues to make progress toward establishing a knowledge-based approach that aligns with acquisition best practices and meets corresponding statutory certification requirements for entering the engineering and manufacturing development phase. Our prior work has demonstrated that positive acquisition outcomes require the use of a knowledge-based approach to product development that demonstrates high levels of knowledge before significant commitments are made. This approach involves achieving the right knowledge at the right time—enabling leadership to make informed decisions about when and how best to move forward. On the basis of this work, we have identified three key knowledge points during the acquisition cycle at which programs need to demonstrate critical levels of technology, design, and manufacturing knowledge to proceed. The Navy's acquisition strategy is for the VXX program to enter DOD's acquisition process at the first of those knowledge points, the start of system development, as shown in figure 1.

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<sup>10</sup>[GAO-13-257](#).

**Figure 1: Program's Anticipated Entry into DOD Acquisition Process and GAO Knowledge Points**



Source: GAO analysis of the VXX program and DOD's acquisition process.

The decision to begin the engineering and manufacturing development phase is referred to as milestone B. By statute and DOD policy, major defense acquisition programs<sup>11</sup>—such as the anticipated VXX program—are required by milestone B, unless waived by the milestone decision authority, to meet certain requirements, including

- demonstration of technology to a certain level of maturity based on an independent review and assessment by the Assistant Secretary of Defense for Research and Engineering;
- appropriate trade-offs among cost, schedule and performance objectives have been made to ensure the program is affordable;
- approval of the program's requirements by the Joint Requirements Oversight Council;
- development of reasonable cost and schedule estimates to execute, with the concurrence of the Director of CAPE, the program's product development and production plan;
- competitive prototyping; and
- a PDR and formal post-PDR assessment have been conducted, demonstrating a high likelihood of the program's accomplishing its intended mission.<sup>12</sup>

Demonstrating technology maturity, making trade-offs, having reasonable cost and schedule estimates, and holding PDRs by milestone B are all best practices. Last year we found that the VXX program had made progress toward establishing a sound VXX business case for development.<sup>13</sup> The program has continued to work toward such a business case and meeting the statutory requirements for milestone B. The Navy has met or expects to meet the

<sup>11</sup>10 U.S.C. § 2430. Major defense acquisition programs are those designated by DOD or estimated by DOD to require an eventual total expenditure for research, development, test, and evaluation of more than \$480 million, or, for procurement, of more than \$2.79 billion, in fiscal year 2014 constant dollars.

<sup>12</sup>10 U.S.C. § 2366b. requires the listed elements with the exception of competitive prototyping. The Weapon Systems Reform Act of 2009, Pub. L. No. 111-23, § 203(a), as amended by the Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Pub. L. No. 111-383, § 813, required the Secretary of Defense to modify guidance to ensure that the acquisition strategy for each major defense acquisition program provides for competitive prototypes before Milestone B approval unless the Milestone Decision Authority waives the requirement. Interim DOD Instruction 5000.02, Operation of the Defense Acquisition System, dated November 25, 2013, implements the statutory requirement.

<sup>13</sup>GAO-13-257.

requirements relating to demonstration of technology readiness, making trade-offs to achieve affordability and getting approval of requirements, and development of cost and schedule estimates that will be independently assessed. It has obtained a waiver from the requirement for competitive prototyping and plans to defer the PDR until after milestone B.

#### Assessment of Technology Readiness Completed

Ensuring that programs have mature technologies before starting systems development is a best practice and essential to avoiding cost and schedule problems. The Navy completed its independent technology readiness assessment of the government designed and developed Mission Communications System (MCS) subsystem to be integrated in VXX aircraft and submitted the assessment to the Assistant Secretary of Defense for Research and Engineering. This office conducted its own independent assessment, and concurred with the preliminary assessment of the MCS which found the MCS to contain no immature critical technologies.

In an April 2013 acquisition decision memorandum for the program resulting from a pre-engineering and manufacturing review, the Under Secretary of Defense for Acquisition, Technology, and Logistics—the acquisition Milestone Decision Authority for the VXX program—instructed the Navy to submit its MCS technology readiness assessment to support the statutory requirement that technology in the program has been demonstrated in a relevant environment before milestone B approval. In addition, at milestone B, the Navy is to provide verification that there are no immature critical technologies in the selected aircraft based on program requirements. A subsequent Navy assessment of potential VXX aircraft completed within the source selection process found no immature critical technologies on the potential VXX aircraft. The Assistant Secretary of Defense for Research and Engineering also concurred with this assessment.

#### Trade-offs to Ensure Affordability and Approval of Requirements Completed

The Navy used a process involving representatives from the VXX program sponsor, requirements, acquisition, and user communities to establish requirements. According to officials we interviewed, following the termination of the VH-71 program in June 2009, a Capabilities Integrated Product Team (CIPT) for the follow-on effort was created. The VXX CIPT is a working-level forum whose mission is to identify, clarify, and resolve all aspects of aircraft mission related issues and program requirements in order to satisfy presidential mission support requirements and U.S. Marine Corps' desired operating capabilities. This team briefs the VXX Integrated Steering Group. Membership in these governing integrated process teams includes key VXX program stakeholders including the Deputy Chief of Naval Operations for Air Warfare (the program sponsor); OUSD(AT&L); Deputy Assistant Secretary of the Navy (Air); Marine Corps Deputy Commandant for Aviation; Marine Corps Combat Development and Integration Command; and presidential helicopter fleet operators; and the White House Military Office (representing both the requirements and user communities).

By December 2011, the Navy proposed a path forward for the VXX program that focused on affordability. In carrying out the requirements setting process, the Navy made trade-offs in capability to achieve affordability and promote competition. The CIPT members considered

potential reductions in requirements and adopted changes that would make the VXX more affordable while maintaining its overall ability to accomplish the VXX mission. According to officials we met with, some of those changes were also expected to promote competition, including reducing the operational availability requirement, increasing the time available to prepare the aircraft for transportability, and dropping a requirement related to the placement of the passenger door. As a result, the Navy's requirements to improve affordability and reduce schedule were accepted by the users and received Joint Requirement Oversight Council approval.

### Independent Cost Estimate in Process

Last year we concluded that completion of an independent cost estimate could confirm the AOA cost estimates.<sup>14</sup> Major defense acquisition programs, such as the VXX program, are required by statute to have an independent cost estimate (ICE) prior to the beginning of system development.<sup>15</sup> In August 2012, OUSD(AT&L) directed that CAPE complete an ICE prior to a pre-engineering manufacturing and development review for the program—a review that occurred on April 5, 2013. Since that review, according to the CAPE official we interviewed, the CAPE has continued work on its cost estimates to refine them, to support the milestone B decision. This estimate will become available once the milestone B decision has been completed.

### Competitive Prototyping Requirement Waived

The Weapon Systems Acquisition Reform Act of 2009, as amended, required the Secretary of Defense to modify guidance to ensure that the acquisition strategy for each major defense acquisition program provides for competitive prototypes before milestone B approval—which authorizes entry into system development—unless the Milestone Decision Authority waives the requirement. WSARA states that the Milestone Decision Authority may waive the competitive prototyping requirement only on the basis that (1) the cost of producing competitive prototypes exceeds the expected life-cycle benefits (in constant dollars) of producing such prototypes, including the benefits of improved performance and increased technological and design maturity that may be achieved through competitive prototyping; or (2) but for such a waiver, DOD would be unable to meet critical national security objectives.<sup>16</sup> When such a waiver is granted based on criteria one for cost reasons, the Weapon Systems Acquisition Reform Act of 2009 requires the Milestone Decision Authority to provide GAO with notification of the waiver under criteria one together with the rationale and for GAO to review and report its assessment of that rationale to the congressional defense committees.<sup>17</sup>

On April 19, 2013, the Navy was granted a waiver to the competitive prototyping requirement for the VXX program. We reviewed the rationale for the waiver and reported our findings in

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<sup>14</sup>[GAO-13-257](#).

<sup>15</sup>10 U.S.C. § 2334

<sup>16</sup>Interim DOD Instruction 5000.02, Operation of the Defense Acquisition System, paragraph 5(d)(4)(b)(2)(b), November 25, 2013, implements the statutory requirement.

<sup>17</sup>Pub. L. No. 111-23, § 203(b).

September 2013.<sup>18</sup> Specifically, in that report we found that DOD's rationale addressed one of the two bases provided in the statute; namely, that the cost of producing competitive prototypes exceeds the expected life-cycle benefits, and found the rationale for the waiver consistent with the statute. Recognizing that the intent of competitive prototyping was to reduce cost and risk, we noted other actions that had been taken that could arguably achieve those goals—reducing requirements, intent to use an existing aircraft and maturing critical technologies prior to integrating them into the aircraft. We also noted that the Navy is gathering engineering knowledge by prototyping and testing sub-systems in its system integration laboratory, before integration efforts begin on the selected VXX aircraft.

### System Level PDR Deferred, Subsystem Review Completed

OSD intends to defer a system level PDR—one that includes the selected aircraft and all integrated equipment—until the awarding of a contract following the milestone B decision. It is a best practice to hold a PDR prior to milestone B as a PDR provides important design knowledge and reduces risk before entering into a development contract.<sup>19</sup> While the Navy's plan to hold the PDR after milestone B deviates from best practices, several factors in the VXX acquisition appear to mitigate the risk. The Navy has completed a PDR of the MCS that is to be provided to the contractor for integration on VXX aircraft. The program's acquisition strategy relies on mature off-the-shelf technologies being placed on an existing aircraft without significant changes being made to the aircraft. The program also provided a detailed technical data package with the VXX solicitation for competitive offers including describing in detail the systems to be integrated into the chosen aircraft, and according to the program manager, VXX offerors were to provide detailed solutions demonstrating how their proposed aircraft can meet the VXX requirements. This is significant because it allows the government an increased understanding of the design considerations in the source selection process. In addition, it is the program's intent that the engineering and manufacturing development phase be contracted under fixed-price incentive contract terms, with a very small portion (less than 2 percent) being cost reimbursable.<sup>20</sup>

Much remains to be accomplished, though, before VXX will be fielded. As the program proceeds through system development and production, it will be important for DOD to continue to

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<sup>18</sup>[GAO-13-826R](#).

<sup>19</sup> A major defense acquisition program may not receive milestone B approval until the milestone decision authority (MDA), among other things, certifies that the program has received a preliminary design review. The MDA may waive the applicability of this and other provisions if the MDA determines that without the waiver DOD would be unable to meet critical national security objectives. 10 U.S.C. § 2366b.

<sup>20</sup> The Federal Acquisition Regulation (FAR) authorizes use of fixed-price-incentive contracts when a firm fixed-price contract is not appropriate; the nature of the supplies or services being acquired and other circumstances of the acquisition are such that the contractor's assumption of a degree of cost responsibility will provide a positive profit incentive for effective cost control and performance. If the contract also includes incentives on technical performance and/or delivery, the performance requirements provide a reasonable opportunity for the incentives to have a meaningful impact on the contractor's management of the work. This contract type provides that the government and the contractor generally share costs—pursuant to a formula—above the target cost and below the ceiling price. FAR authorizes use of a cost reimbursement contract when circumstances do not allow the agency to define its requirements sufficiently to allow for a fixed-price type of contract or uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract. When using this contract type the government pays for all allowable incurred costs to the extent prescribed in the contract.

maintain discipline in following best practices. If it does not, then the risks accruing from failures to follow those practices could result in significant cost, schedule, and performance problems.

We are not making recommendations in this report.

### **Agency Comments and Our Evaluation**

DOD did not offer any general comments on a draft of this report, but did provide technical comments, which were incorporated where appropriate.

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We are sending copies of this report to interested congressional committees; the Secretary of Defense; the Under Secretary of Defense for Acquisition, Technology, and Logistics; and the Secretary of the Navy. This report also is available at no charge on GAO's website at <http://www.gao.gov>.

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A handwritten signature in black ink, appearing to read 'Michael J. Sullivan', with a stylized, flowing script.

Michael J. Sullivan, Director  
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